Remarks

Applicants thank the Examiner for the Examiner Interview conducted on November 8, 2004.

Upon entry of the foregoing amendment, claims 1-7, 9-14, 16-20, 22-25, and 27-36 are pending in the application, with claims 1 and 16 being the independent claims. Claims 1-3, 7, 9-10, 16-18, 20, and 22-25 are sought to be amended. Claim 8, 15, 21 and 26 are sought to be cancelled without prejudice to or disclaimer of the subject matter recited therein. New claims 27-36 are sought to be added. Independent claims 1 and 16 have been amended to include additional points of clarification that are believed to be allowable in light of the Office Action. Claims 2-3, 7, 9-10, 17-18, 20, and 22-25 have been amended for further clarification in accordance with the amendments made to the independent claims. Claims 1, 20, and 24-25 were amended to correct dependencies and/or antecedent basis. These changes are believed to be fully supported by the specification and are not believed to introduce new matter. Applicants therefore respectfully requested that these changes be entered by the Examiner.

Based on the above amendment and the following remarks, Applicants respectfully request that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

Objections to the Drawings

On page 2 of the Office Action, the Examiner objected to Figures 9 and 10 as failing to include reference numbers mentioned in the written description. Figures 9 and 10 have been amended herein. In Figure 9, reference numbers "910a", "910b", "910c", and "910d" have been included in accordance with the specification as originally filed.

In Figure 10, reference number "1000" has been included in accordance with the specification as originally filed. The proposed changes add no new matter to this application. Applicants therefore respectfully request that the Examiner reconsider and withdraw the objection.

Claim Objections

On page 2, the Office Action states that claim 1 is objected to because the recited feature "the received data signal" lacks sufficient antecedent basis. Claim 1 has been amended to provide sufficient antecedent basis for this feature.

On page 3, the Office Action states that claims 24 and 25 are based on the method of claim 23 and incorrectly refer to "the system of claim 23." Claims 24 and 25 have been amended to properly refer to "the method of claim 23."

The proposed changes add no new matter to this application. Applicants therefore respectfully request that the Examiner reconsider and withdraw the objections.

Rejections under 35 U.S.C. § 112

On page 3, claims 9 and 22 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. Specifically, the Office Action states that the specification does not enable one skilled in the art to "'rotate the interpolated phase of the sampling signal *at a rate corresponding to the frequency offset*.'" Further, the Office Action states that the specification "does not relate to or enable one skilled in the art to modify any frequencies." Applicants respectfully traverse this rejection.

Paragraph 185 of the specification states that the "[i]nterpolated sampling signal

has a frequency ω_s (based on reference frequency ω_r) and an interpolated phase φ_I." The

specification next states that "since frequency is the derivative of phase (that is, $\omega =$

$d\varphi/dt$, where φ is phase), [the] interpolator can repetitively rotate interpolated phase φ_I

through 360° at a predetermined rate to frequency shift sampling frequency ω_s away from

the base frequency ω_r." This enables paragraph 186 of the specification to state that "the

sampling frequency ω_s of [the] sampling signal is governed by the equation:

$$\omega_s = \omega_r \pm d\varphi_I/dt, \text{ or equivalently}$$

$$\omega_s = \omega_r \pm \Delta\omega_I",$$

where $\Delta\omega_I$ represents the magnitude of the frequency shift away from reference

frequency ω_r and $d\varphi_I/dt$ represents the rate at which interpolated phase φ_I is rotated.

Paragraph 187 of the specification therefore concludes that "the present invention can

rotate [the] phase φ_I of [the] sampling signal at different rates to correspondingly produce

different sampling frequencies ω_s."

Paragraph 190 of the specification describes the function of the phase error

processor depicted in Figure 19. The phase error processor includes "a frequency offset

estimator (also referred to as a long-term phase processor)." Paragraph 192 of the

specification states that the "frequency estimator integrates phase errors over a relatively

long period of time." Specifically, "[f]requency estimator examines changes in [the]

phase error signal over time to derive an estimate of a frequency offset, for example, $\Delta\omega$,

between [the] serial data signal and [the] sampling signal." Paragraph 91 of the

specification states that the "phase error [signal is used] to derive one of a set of rotator

control signals or commands."

Paragraph 173 of the specification states that the [p]hase-advance and -retard commands [,(which are two versions of the rotator control signal),] can be implemented as pulsed commands." Further, paragraph 173 of the specification states that "the interpolated phase of [the] sampling signal can be incrementally rotated clockwise or counter-clockwise through a range of 360° by successively pulsing [rotator control signal] commands." Paragraph 173 of the specification continues by stating that "[t]he rate at which the interpolated phase of [the] sampling signal rotates corresponds to the repetition rate of pulsed [rotator control signal] commands." Paragraph 194 of the specification states that rotator control signals are generated "at a repetition rate based on the frequency offset estimate $\Delta\omega$." Paragraph 194 of the specification therefore concludes that "[t]his causes [the] digital control signals and correspondingly the phase of sampling signal to rotate *at a rate based on (for example, equal to) the frequency offset $\Delta\omega$*."

Based on the forgoing remarks, Applicants have shown that the specification does relate to and does enable one skilled in the art to modify frequencies. Specifically, the specification describes how to adjust the sampling frequency of the sampling signal to match the frequency of the serial data signal. Further, Applicants have shown that the specification enables one skilled in the art to rotate the interpolated phase of the sampling signal at a rate corresponding to the frequency offset between the serial data signal and the sampling signal in order to achieve frequency synchronization. Accordingly, Applicants request that this rejection be reconsidered and withdrawn.

Rejections under 35 U.S.C. § 102

Claims 1-26 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S.

Patent No. 6,002,279 issued to Evans, et al., (hereinafter "Evans"). Applicants

respectfully traverse this rejection.

Independent claim 1 has been amended to clarify that the phase interpolator

produces both a "data sampling signal and a phase sampling signal each having an

interpolated phase responsive to a plurality of phase control signals" such that "the phase

sampling signal is offset in phase relative to the data sampling signal by a predetermined

amount." This amendment is supported, for example, by paragraphs 87 and 106 of the

specification. Independent claim 1 has also been amended to clarify that "a data path . . .

samples the received serial data signal according to the data sampling signal to produce a

data signal [and] a phase path . . . samples the received serial data signal according to the

phase sampling signal to produce a phase signal." This amendment is supported, for

example, by paragraphs 88 and 89 of the specification.

Further, independent claim 1 has been amended to recite that "a phase detector . .

. produces a phase error signal based on the data signal and the phase signal, wherein the

phase error signal is indicative of a phase offset between the data sampling signal and the

received serial data signal." This amendment is supported, for example, by paragraph 90

of the specification. Independent claim 1 has also been amended to recite that "a phase

error processor . . . produces a rotator control signal based on short-term error

processing and long-term error processing of the phase error signal." This amendment is

supported, for example, by paragraphs 190-194 of the specification.

Independent claim 16 has been amended in accordance with the aforementioned

clarifications and features recited in claim 1. Claims 1 and 16, as amended, are not

taught or suggested by Evans. Accordingly, Applicants request that the rejection under

35 U.S.C. § 102(e) be reconsidered and withdrawn and that claims 1 and 16 be passed to allowance.

Claims 2-7 and 9-14 depend from independent claim 1 and thus are patentable for at least the reasons provided above with respect to claim 1. Claims 17-20 and 22-25 depend from independent claim 16 and thus are patentable for at least the reasons provided above with respect to claim 16. Applicants therefore request that the rejection of claims 2-7, 9-14, 17-20, and 22-25 under 35 U.S.C. § 102(e) be reconsidered and withdrawn.

New Claims 27-36

New claims 27-31 depend from amended independent claim 1. New claims 32-36 depend from amended independent claim 16. Support for new claims 27-29 and 32-34 is found, for example, on pages 41-44 of the specification. Support for new claims 30-31 and 35-36 is found, for example, on page 21 of the specification. Claims 27-36 are thus patentable for at least the reasons provided above with respect to claims 1 and 16. Applicants therefore respectfully request prompt consideration and allowance of new claims 27-36.

Nonstatutory Double Patenting Rejection

Claim 1 is provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 09/844,432. Applicants hereby agree to file an appropriate terminal disclaimer upon a finding of allowable subject matter.

References Made of Record

As indicated in the Office Action, the Examiner has considered the references

cited on page 2 (of 2) of the supplemental Information Disclosure Statement filed on July

24, 2002. Applicants note, however, that the Examiner did not indicate consideration of

the references cited on page 1 of the same Information Disclosure Statement. Applicants

therefore request that the Examiner verify consideration of the references cited on page 1

of the supplemental Information Disclosure Statement filed on July 24, 2002 to ensure

the references submitted are made of record.

Conclusion

All of the stated grounds of objection and rejection have been properly traversed,

accommodated, or rendered moot. Applicants therefore respectfully request that the

Examiner reconsider all presently outstanding objections and rejections and that they be

withdrawn. Applicants believe that a full and complete reply has been made to the

outstanding Office Action and, as such, the present application is in condition for

allowance. If the Examiner believes, for any reason, that personal communication will

expedite prosecution of this application, the Examiner is invited to telephone the

undersigned at the number provided.

Prompt and favorable consideration of this Amendment and Reply is respectfully

requested.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Patrick E. Garrett
Attorney for Applicants
Registration No. 39,987

Date: ___11/9/04___

1100 New York Avenue, N.W.
Washington, D.C. 20005-3934
(202) 371-2600
MQL/JTH/agj
SKGF\DCI\218777.2

Amendments to the Drawings

Applicants submit herewith two (2) replacement drawing sheets containing proposed corrections to Figures 9 and 10. Please substitute the replacement Figures 9 and 10 for pending Figures 9 and 10. The changes made introduce no new matter and their entry is respectfully requested.